The forests in the EU Mediterranean basin: different management models and problems

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Abstract: - The following paper presents several situations of the forest management and their response to different problems in the diversity within the Mediterranean Forests. A survey was carried out in the several partners’ areas of the PROTECT project (An Integrated European Model to Protect MEDiterranean Forests from Fire), regarding the different forest types and management approaches in order to allow a detailed data collection of the most important questions for fire prevention and forest management. The analysis shows that there are several management regimes that may be improved with experiences from other countries. Also, there are some common problems which need solutions in the different areas, namely forest fires, for which the main causes are related to arson and negligence situations. This general information also provided a good background for carefully applying and adapting different forest’s management models, both ecological and economically sustainable, in the PROTECT partners, where the problems and agents to be considered are different, giving conditions for the adaptation and development of a common model.

Key-Words: - forest management, fire prevention, Mediterranean forests, forest uses, PROTECT project, survey.

1. Introduction
The forests are sensitive and important ecosystems for the human life and for human surviving: they are a way of carbon fixating, but also of preserving the biodiversity, being essential for the subsistence of different species [7,9].

In this context, the Mediterranean area is a rich area regarding, not only the fauna and flora [24], but also the several ways of life activities and culture result of millenniums of human activity within it. However, at a global level, the characteristics of the Mediterranean region have not received much attention by foresters and environmental specialists [13]. It is recognized that, apart from the FAO (Food and Agriculture Organization) initiative of drawing up a Mediterranean forests action program, approved at the March 1992 session of Silva Mediterranea in Faro, Portugal, little attention has been given to Mediterranean forests at international level [16].

Mediterranean forests are therefore being managed in different ways, according to the legislation and ideals of the countries, but still following some guidance regarding the European Union’s policies. These result in different strategies towards the development of the territory and the valorization of resources, which represent also a way of protecting the forests from fires, decreasing the ecosystem vulnerability to fire. Environmental features, as well as vegetation structure
(composition and frequency), are key factors to estimate that vulnerability [4].

Therefore, the PROTECT project (An Integrated European Model to Protect MEDiterranean Forests from Fire) has several relevant objectives including to develop and introduce a sustainable economic and environmental forest maintenance model to prevent/reduce the outbreak and deployment of forest fire by appropriate forest cleaning and reuse of biomass [19].

In order to apply such a model, data is needed, namely the detailed knowledge of the forests’ situation within the different areas participating in this study: forests characteristics, management models, forest uses and outputs and fire prevention.

Therefore, and with respect for the PROTECT project’s objectives, a survey was developed in all the project partners. This allowed to obtain general information necessary for the model framework design, but also permitted the analysis of the practices carried out in some countries which may be applied and followed according to the main positive achievements carried out in other areas.

The remainder of this study is organized as follows. In section two the localization of the participants in this study is made; in section three the methodological approach is described; in section four the results are presented and discussed; and, in section five, the conclusion is presented regarding the main findings of this study.

2. The study areas
The different study areas correspond to the different partners’ areas, who are participating in the PROTECT project. The partners are the Province of Macerata (Italy), Provincial Government of Malaga (Spain), Region of Peloponnese (Greece), National Forest Authority (Portugal), Department of Forests-Cyprus (Cyprus), University of Camerino (Italy), University of Algarve (Portugal), University of Provence (France) and Region of Istria - Department of Sustainable Development (Croatia). Due to funding specific problems, the Region of Istria - Department of Sustainable Development (Croatia) abandoned the project.

The following figure (figure 1) presents the several countries participating in the PROTECT project.

Fig. 1- The different countries participating in the project
(source: own elaboration)

3. The methodological framework
The methodological framework aimed to collect information which could result in a comprehensive analysis of each partner’s situation. To do so, a methodology presented on the RECOFORME project (Structuring of networks and co-operation actions for the Mediterranean forest) was used. This methodology is based on the idea that a cooperative approach may be quite useful for solving problems existent in different areas and this cooperation would make possible to compare each person's know-how in each specific situation, following the premise the some countries have already solved technical or organizational problems that others have yet to solve [21].

Therefore, the methodological framework used was based on several steps, which are presented next (figure 2). These were all carried out during the PROTECT project, and constituted an initial phase of the WP2 work.

Fig. 2- The methodological framework followed

In a first step a general questionnaire was created, with a structure defined to allow a detailed insight about the forestry situation in the different
areas: 1) Forest physical characteristics 2) Forest uses, 3) Output, 4) Social/ legal issues, 5) Forest management, 6) Forest fires and prevention, 7) Agro forestry farms.

In a second step the questionnaires were distributed to all partners, which implemented them according to our guidelines.

In a third step, the questionnaires were analyzed following a critical opinion of different experts regarding their validity and eventual doubts/inefficiencies regarding filling the formularies.

The data was analyzed and statistical analysis was implemented. Therefore, a detailed analysis for each variant of the management model, to be developed, was made.

In a fourth step, possible innovations and new ideas were analyzed, following the premises that a cooperation approach may give some good results.

Finally, in a fifth step, a reflection about the data collected for modeling purposes was made, regarding possible problems of this approach. This gave us an idea of the problems presented by this approach and allowed the design of guidelines for a posterior application in other areas.

4. Results

The results are presented next and follow the main points of the survey structure. This presentation is drawn this way to allow an easier understanding of these subjects as well as a better and detailed approach of the different subjects.

4.1. Forest physical characteristics

Regarding the physical characteristics of the forests there are quite different physical characteristics among the project partners and the forest occupies different shares of the area.

The first characteristic that differentiates all these forests is density: usually the lowest levels of forest density are in the areas where the pluviometric values are lower and the temperature is higher. Anyhow, this is not a fully direct relation as other physical factors relating to the geology, soils and human intervention must be considered. The following figure (figure 3) presents the situation in the different studied PROTECT partners.

![Fig. 3- The forest density in the PROTECT partners (source: survey results)](image)

Regarding the Province of Macerata there is a predominance of broadleaf and deciduous species. It is estimated that about 95.2% of woods are composed of broadleaf forests and 4.8% of reforestations with conifers and about 92.4% of woods are composed of deciduous forests and 7.6% of evergreen forests. Evergreen forests floristic composition has always a percentage of deciduous trees (meanly 37% as number of individuals and 32% in volume). The most widespread deciduous woods are dominated by Quercus pubescens s.l., Ostrya carpinifolia, Quercus cerris or Fagus sylvatica. Also, the evergreen woods are dominated by Quercus ilex subsp. Ilex.

Regarding Cyprus, there are only permanent leaf trees and the vegetation formation is composed mainly by trees, including understory shrub and bush, where coniferous species predominate. The dominant specie is the Pinus, occupying more than 90% of the forest area. The main tree species in Cyprus are the the Pinus brutia, the Calabrian Pine, which thrives up to 1.200 m altitude, the Pinus nigra ssp. pallasianna, the Troodos Pine, which forms thick forests around the central Troodos area from 1.200 up to 1.950 m and finally, the Cedrus brevifolia, which is restricted around Tritylos peak (Paphos Forest) from 800 up to 1.400 m.

As regards shrubs these are either part of the understory of the forests or they form extensive maquis and garigues. Under favorable conditions some shrubs attain dimensions of small trees. The main shrub species found in Cyprus are: Juniperus phoenicea, Phoenician Juniper, Quercus alnifolia, Golden Oak, Acer obtusifolium, Maple, Arbutus andrachne, Strawberry Tree, Pistacia lentiscus, Lentisk.

In the Region of Peloponnese, Greece, the situation is the same: there is only permanent leaf forest and the forest is dominated by coniferous species such as fir, black pine and chirr pine. The
undergrowth consists of broadleaf species such as *P. lentiscus*, holly, *Arbutus*, *Olea europea*.

In France, the South-East forest is a mixture of broadleaved species and conifers with evergreen foliage, maquis scrublands and wooded garrigue scrublands.

Finally, in Portugal, Algarve, the predominant type is a permanent leaf forest, where the main species are Cork oaks, Eucalyptus and Holm Oaks. The first one is located preferentially in Serra do Caldeirão (in the center north of the Algarve territory) and Serra do Espinhaço de Cão (in the southeast of the territory). The Eucalyptus plantations are mostly located in Serra de Monchique (in the northeast of the Algarve territory) and they are more recent in the territory.

The following table (table 1) synthesizes the main composition of the forests studied.

4.2. Forest uses and Output

Related with the different characteristics of the forests very distinguished uses are developed. In Italy, the main forest objective is wood production, considering both the production and protection issue. No other additional objective is considered relevant and therefore it reflects a kind of specialization of the forest. In Cyprus there are three main forest uses: wood production, wildlife conservation and tourism. In Portugal and Greece, the two main uses are wood production and (wildlife conservation.

These differences lead, of course, to different outputs obtained from the forest. In the Province of Macerata, the main output is timber, which is used mainly as firewood and there is also some unspecified production of truffles and fungi. In Cyprus the main output is pinus timber for local private sawmills and as fuelwood and charcoal. In the Region of Peloponnese, Greece, the main output is also timber, mainly for sawn timber and for firewood. In south France the main output is timber and in the Algarve, Portugal, the forest has two main outputs: timber (for wood and paper pulp) and cork, which has a very high quality in this area.

The above analysis shows the usual lack of interest on alternative products, such as non-timber products, that are potentially interesting in these areas.

4.3. Social/ legal issues

In what concerns social and legal issues, namely the ownership of the forest area, the situation is also quite different among all the PROTECT partners.

In the Province of Macerata the forest is mostly private, mainly held by small owners or small owners associated in "Comunanze Agrarie", that are particular forms of collective ownership. In this case the lands belong to the forest inhabitants and each member can exercise the rights of civic use, for the traditional forms of exploiting the land, namely grazing and wood harvesting. In Cyprus the forest is mainly public and is therefore mostly managed by the state entities. In the Region of Peloponnese, Greece, the highest percentage of forest land is state owned. The small non-public percentage is either private, municipal, church property or held by co-owners. On the contrary, in south France the ownership is mainly private: 3/4 of these owners have inherited their forest, 85% of them live in the region where is located their forest and 57% of private owners are retired people.

Finally, in the Algarve, Portugal, almost all of the forest is private, held by individuals and enterprises, mainly in small dimension areas.

4.4. Forest management

The management models are different in all these partners with different organization forms, although all admit to promote the participation of different agents and stakeholders, in a participatory approach.

In the Province of Macerata, Italy, there is a combination of a public, associative and private managing system. Forest management in Italy is subjected to DM June 16th 2005, the so called "Guidelines for forest planning". Regions must draw up their Regional Forest Plan that define the range of application, conservation strategies and forest sector development. Also, Marche's Regional Law number 6 of February 2 2005 provides guidelines for Forest Regional Plan and so the regional plan for this area was approved by Marches Regional Council on February 26th 2009.

This plan provide indications about regional forest heritage, the functions of woods, guidelines
for management of public properties (Demanio Forestale Regionale), the criteria for a sustainable management of Marches woods, woods to be submitted to management forms and priority of intervention, management modes in public properties (Demanio Forestale Regionale) and all the other woods.

Management plans are drawn up by "Comunità Montane", which directly manage woods belonging to "Demanio Forestale Regionale" and authorize felling, activities and interventions in all the woods belonging to their territories, exception for small cutting areas. Out of territories belonging to "Comunità Montane", cutting down is authorized by the Province of Macerata. Due to the legal framework, only in particular cases, the Province of Macerata can authorize forest surface reduction or transformation of forests in other kinds of land uses, due to preservation objectives.

The Region of Peloponnese has a forest management model based on public laws. For regulation purposes, two main Forest Acts have been enacted: the forest code 86 in 1969 and, the law 998 in 1979 which are also supported by additional acts.

In Cyprus the management system is based on the multiple uses of forest resources and seeks to protect and improve the natural environment for the benefit of all citizens and visitors from abroad. The system is directed to improve the forests condition, the conservation of soils and watersheds, the protection of flora, fauna, biodiversity and heritage, the promotion of ecotourism and the sustainable production of wood and non-wood products, up to the forests’ capacity limits. This public state model also incentives the participation of different stakeholders and has not the profit as main objective.

In France, the management system for forests, whatever the type of owner (private or public), is based on a sustainable model. The public forest, managed by Office National des Forêts (ONF), is divided between state-owned forest and other public forests that belong to local authorities, mainly townships. Private forests management is realized by certified forest managers or by the CRPF (Regional Centre of Forest Ownership) or by the owner itself. Whatever the manager, if the surface of the forest is more than 10 ha, the "Serot" french act must be applied. This act imposes a specific management plan. The FFN (National Forestry Fund) gives the owners financial support. The FFN is financed by tax payments given by all wood industrials or importers.

In the Region of Algarve, Portugal, the management model includes private, associative and public owners. The majority of the area is managed by privates. There are several forest producers associations who give technical support to these private managers. Since 2005 a new territorial ordinance figure was created - the Forest Intervention Zones (FIZ). A FIZ is a continuous and delimited area, composed mainly by forest spaces, subjected to a forest management plan and to a specific plan of forest intervention and managed by an entity (which may be a forest producers’ association). It has a minimum of 750 ha and includes at least 50 owners or forestry producers and 100 rustic proprieties. It is constituted by the initiative of a group of land owners or forestry producers - the creator nucleus. Finally, the public areas are managed by the central state (matas nacionais) or in associations between the central state and the municipalities (forest perimeters).

4.5. Forest fires and prevention

The forest fires are a problem in these areas, which were however differently affected by fires in the last years. The following figure (figure 4) represents the burnt area (ha) and the number of fires in the different partners’ areas.

Fig. 4- The forest burnt area and the number of occurrences
(source: survey results)

The causes of fires within the different areas seem to be mainly two: arson and negligence, although there is a large number of fires due to unknown
5. Conclusion

As it was presented before, among the studied Mediterranean partners there are different forests with different physical characteristics. These physical characteristics are related with different physical and human factors. This means that this diversity may require some detail in the model in order to perceive and better define the different iterations of agents and factors.

Regarding forest main uses, it seems to be quite a specialization of activities, others uses as non timber productions and tourism not being valorised, in spite of some cases of success. It seems therefore that would be an additional gain the correct analysis of ways to valorise those products.

Regarding forest management, there was shown that there are different management models which may easily respond to problems in other areas. In Portugal the recently created FIZs could be an interesting solution to replicate in other areas such as France or province of Macerata, or the ideals of the "Comunità Montane" could work and improve the situation in Portugal. This is specially true for those areas whose types of owners are the same.

For forest fires, the conclusion is that fires are mainly due to negligence and arson. Although there is a substantial number of fire occurrences that have as main causes unknown, it is known that many of these are also arson, negligence or accident. This leads us to conclude that there must be a concerted approach for fighting these fire causes.

The common model to be developed should therefore be adapted to the different problems of each area trying to benefit from the solutions already found in the field by the different partners.

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